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UNION CARBIDE CORPORATION
NUCLEAR DIVISION
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February 1, 1977

United States Energy Research and Development
Administration, Oak Ridge Operations
Attention: Mr. H. Doran Fletcher, Director
Uranium Enrichment Operations Division
Post Office Box E
Oak Ridge, Tennessee 37830

1153

Gentlemen:

Project Progress Report for January 1977
NIOSH Standards Evaluation of Nickel Powder

Enclosed is the report for January, 1977, on the subject project. This study program was recently organized in an effort to evaluate the health effects of handling nickel powder and to help in determining whether a recent NIOSH proposal to reduce tolerable airborne nickel levels by a factor of 200 is necessary with regard to elemental nickel.

I have included two copies of this report for your transmittal to International Nickel, Inc. (INCO), whose representatives have proposed to share the costs of this study.

Very truly yours,

R. A. Winkel, Plant Manager
Oak Ridge Gaseous Diffusion Plant

RAW:CWW:pgc

Enclosure: Report - K/NI-1, Part 1

cc: U.S.E.R.D.A - O.R.O. (3)
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Mr. R. W. Levin
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PROJECT PROGRESS REPORT FOR JANUARY 1977 NIOSH STANDARDS EVALUATION OF NICKEL POWDER

C. W. Weber
Manager, NIOSH Standards Evaluation Project

J. C. White
UCCND Technical Services Manager

February 1, 1977

UNION CARBIDE

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

prepared for the **U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION**
under **U.S. GOVERNMENT** *Contract W-7405 eng 26*

HIGHLIGHTS

This is the first in a series of progress reports on a study of K-25 personnel who have worked in areas where nickel powders were used and handled. The project was initiated to evaluate the health effects of handling nickel powder and to help in determining whether a recent NIOSH proposal to reduce tolerable airborne nickel levels by a factor of 200 is necessary with regard to elemental nickel.

During January the basic organization of the project was completed, staff briefings were held, and studies were commenced on the personnel data and environmental exposure data available.

PROJECT PROGRESS REPORT FOR JANUARY 1977
NIOSH STANDARDS EVALUATION OF NICKEL POWDER

INTRODUCTION

The National Institute of Occupational Safety & Health (NIOSH) is currently proposing to reduce the tolerable airborne levels for nickel by a factor of 200, down to the level of 5 µg/cu m. The International Nickel Corporation (INCO), ERDA, and UCCND are very concerned with this proposal and have discussed the possibility of conducting an epidemiologic study of K-25 personnel who have worked in areas where nickel powder was used and handled. Similar studies have been made by INCO; however, it was not feasible to exclude exposure to other nickel compounds and impurities. An objective study at K-25 could provide data uniquely isolating elemental nickel, which might be used to better establish the health effects of nickel powder exposure. INCO has proposed to share the costs of the study.

Following a general discussion in December, 1976, of such a study at K-25, this project was initiated with the following objective: to organize and conduct a study of K-25 employees who have worked in areas where nickel powder was used or handled, in an effort to evaluate the health effects of such work. This project includes an epidemiologic study of K-25 nickel workers, with an examination of environmental exposures and associated industrial hygiene monitoring.

PROJECT ORGANIZATION

Dr. C. W. Weber was appointed Project Manager reporting to Dr. James C. White, UCCND Technical Services Manager. Other participants presently appointed to the project are: Dr. T. G. Fortney, Medical; Mr. R. D. Gilmore, Industrial Hygiene; Mr. M. E. Mitchell, K-25 Environmental Management; and Dr. E. D. Tompkins, Epidemiologist. Dr. Tompkins is a member of the ORAU (Oak Ridge Associated Universities) staff, specifically the Medical and Health Sciences Division; she is Q-cleared, familiar with many of the K-25 and ERDA organizations involved, and is presently available for this project. Other epidemiologists of national reputation may be consulted later to review and offer critique of our progress and final report.

Other project support will include an ORAU biostatistician, computer personnel, clerical help, analytical and environmental help, and possibly others.

EPIDEMIOLOGIC STUDY

The existence of relevant data on a group of about 2500 nickel workers was identified at the UCCND Computer Technology Center (CTC). ERDA has arranged to release pertinent data on this test group to Dr. E. D. Tompkins. Two computer printouts have been received from CTC. One is a listing of the approximately 2500 UCCND workers ever exposed to nickel, giving for each worker the Name, Social Security Number, Birthdate, Sex, Race, Work locations, Year beginning each work location, and Job description. Review of this listing revealed that only about 40% of these workers have worked in the K-25 Barrier Plant. The second printout from CTC gives a more detailed work history of the approximately 1000 workers who have ever worked in the Barrier Plant. Information from these printouts is presently being used to calculate the number of employee-years-of-exposure received by workers in powdered nickel (barrier) operations. The employee-years-of-exposure are being identified with appropriate calendar years in order to take into account changes that have occurred in the production process.

Additionally, the applicable K-25 employee data are being scoped to establish the total number of employee-years-at-risk. The two parameters, employee-years-of-exposure and employee-years-at-risk, will be used to make some early statistical judgments about the test group. A worthwhile epidemiologic study is not feasible if these aspects are too limited. The scoping calculations will soon be completed.

Of particular interest in this study will be the mortality rates and causes of death of former nickel workers. Special attention will be given cancerous diseases, particularly lung and sinus cancer. The long latency periods for these diseases will require that the emphasis be placed on employment prior to 1956. This further reduces the number of employees in the major test group and the pertinent years-of-exposure and years-at-risk.

A listing of deaths that have occurred in the population of 1000 nickel workers has been requested from CTC. Following review of this information, death certificates will be obtained and examined for causes of death.

Upon completion of the above tasks, a determination can be made either to propose a formal epidemiologic study or to state why such a detailed study would not be warranted.

ENVIRONMENTAL EXPOSURE

In parallel with the work on the computerized employee work histories, information is being collected from CTC banks, storage in Plant Record vaults, and recent Industrial Hygiene records, which will aid in defining the conditions and levels of employee exposure. These data will include air monitoring and personnel urinalysis values for nickel. Examination of the air monitoring data related to the nickel working environments reveal frequent prevailing conditions in some areas and excursions in others, at concentrations appreciably greater than 5 µg/cu m, the tolerable airborne nickel level recently proposed by NIOSH.

In addition to the study of nickel working environments, two other atmospheric nickel studies were undertaken. One study involved data collected over the past five years within the confines of K-25. The other consisted of collecting and analyzing a limited number of atmospheric samples from five different regions of East Tennessee, in several directions from K-25. The plant data, representing sites located approximately north, south, east, and west of the center of the plant, revealed atmospheric nickel levels ranging from < 0.004 to > 6.0 µg/cu m.

Based on the limited number of off-site samples, the atmosphere in the vicinity of K-25 contains greater nickel concentrations than in surrounding East Tennessee regions. The samples collected from areas remote to K-25 contained nickel concentrations ranging from < 0.004 to ~ 0.13 µg/cu m.

It is apparent, therefore, that the working environments for those handling nickel powder, and also occasionally the general plant environments outside of the Barrier Plant but within the confines of K-25, exceed the level of 5 µg/cu m of nickel, proposed by NIOSH as a new maximum tolerance for airborne nickel.

COORDINATION AND CONTROL

The project study group has visited the Barrier Plant and plans additional briefing and tours. More complete information will be received relevant to work history of specific employees and nickel exposure conditions.

Assuming a complete epidemiologic study will be conducted, an appropriate control group will be identified, probably from either unexposed K-25 employees, or UCCND employees at other sites.

A special account has been set up for collecting costs of this project. Following mutual agreement concerning the scope and estimated cost of ORAU assistance, a special order will be issued covering the funding authorization.

A program of billing to INCO will be initiated following execution of a formal agreement with that company.

Monthly progress reports will continue to be generated on this project to inform management at ERDA-ORO, K-25, and INCO. These organizations will also participate in the review of the final report of this study.

Distribution

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